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CLEAN WATER FOR MID-AMERICA

Federal Water Pollution Control Administration
Chicago, Illinois

April 1970

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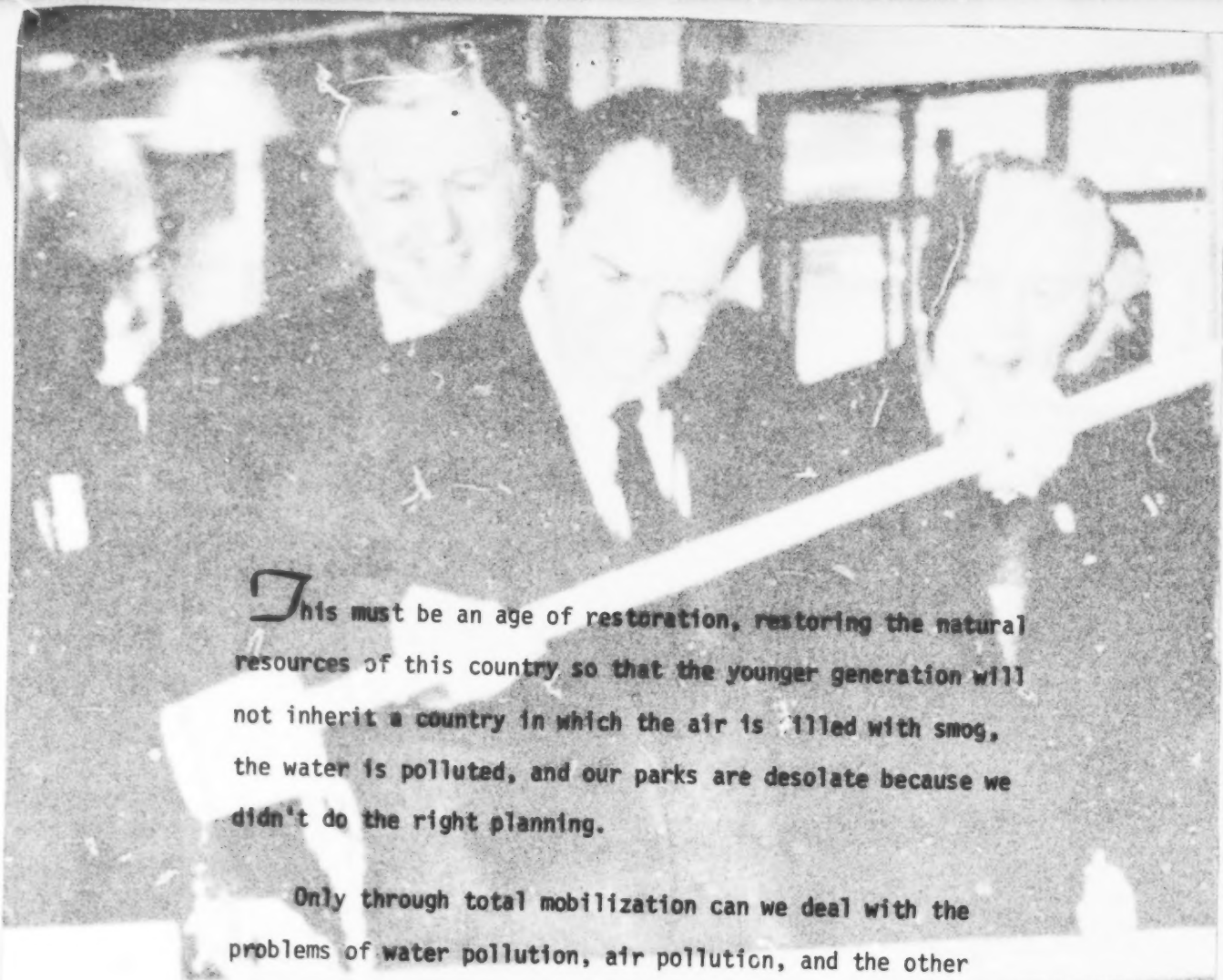

This must be an age of restoration, restoring the natural resources of this country so that the younger generation will not inherit a country in which the air is filled with smog, the water is polluted, and our parks are desolate because we didn't do the right planning.

Only through total mobilization can we deal with the problems of water pollution, air pollution, and the other problems which affect our environment.

Richard Nixon

February 6, 1970
Chicago

CLEAN WATER FOR MID-AMERICA

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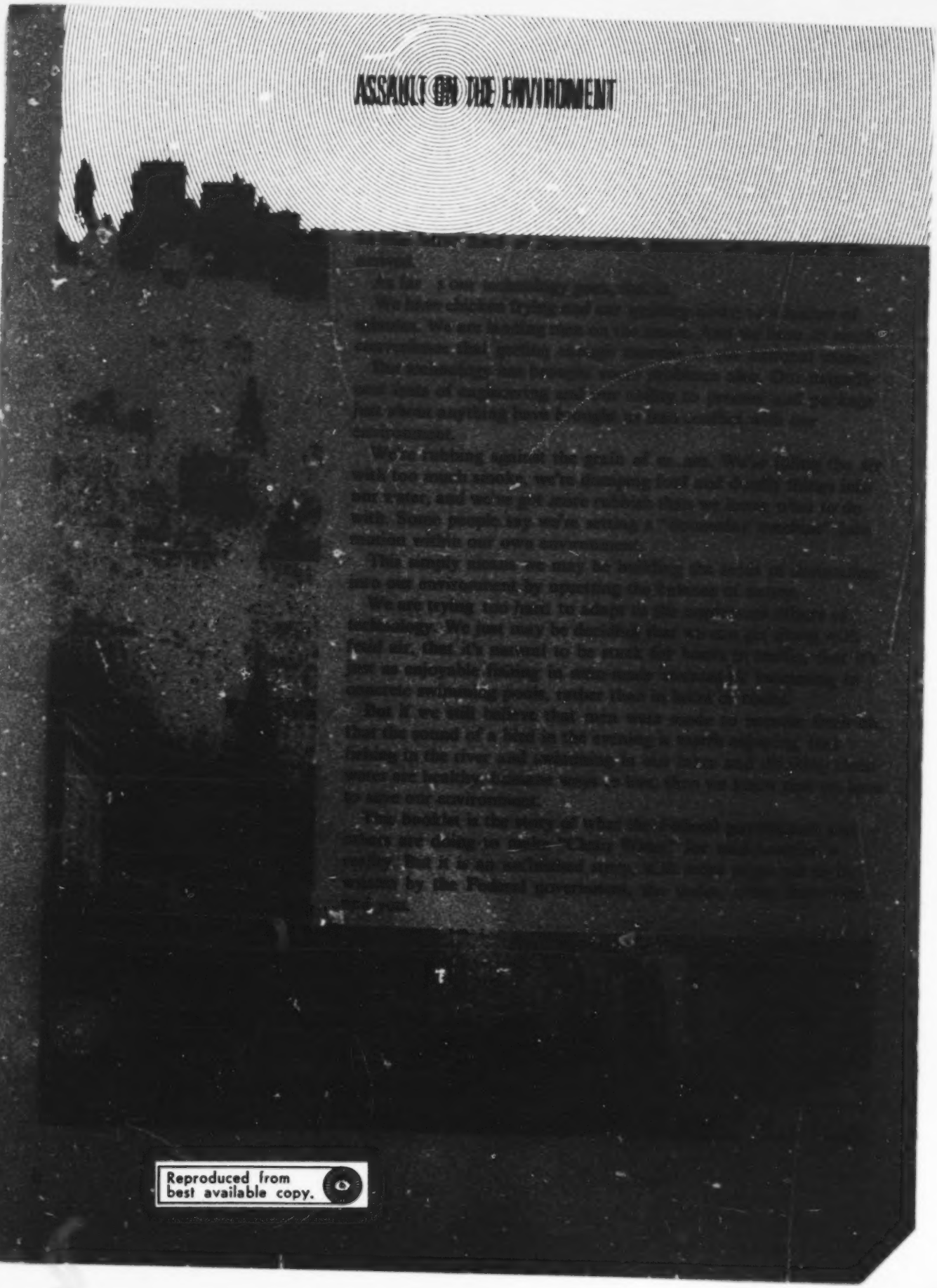

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WATER QUALITY

This booklet is about the major fresh waters of mid-America — the Great Lakes and the Upper Mississippi River.

There are two undeniable facts about mid-America's waters. They are in great supply; and they are in great demand.

For example, the interconnected Great Lakes form the largest body of fresh water in the world. Over 30 million Americans live within close reach of them, and 80 percent of these people live in metropolitan areas. Metropolitan areas are supported by manufacturing activities that account for a substantial share of America's Gross National Product. One-fourth of the nation's total manufacturing activity is located in this region. Soon after the turn of the century the population of the Great Lakes area will exceed 50 million people and industrial activity will have increased four to fivefold.

These statistics simply mean that there is and will continue to be a heavy demand for the waters of mid-America.

Rarely, if ever, is water found anywhere as pure as H2O. It is

always "polluted" to use the narrow sense of this word. But pollution, as we have come to use the term in our daily speech, means simply that a certain body of water is not able to be used for its intended purpose.

If you want to go swimming and the water is smelly or muddy, then you might call it "polluted." If you want that same water for cooling a power plant, it might be just right for you, so you wouldn't say it's polluted.

However, there are what are called the "freedoms" or general requirements which all waters should have to be considered unpolluted. These "freedoms" include:

* Freedom from materials that will settle or form objectionable deposits.
* Freedom from floating debris, oil, scum, and other similar matter.
* Freedom from substances producing objectionable color, odor, taste, or turbidity.
* Freedom from materials which in concentration or combination are toxic or which produce undesirable physiological responses in humans, fish and other animal life and plants.
* Freedom from substances and conditions or combination that in concentration will produce undesirable aquatic life.

Most pollution, or low water quality, has been caused by two major sources: cities and industries. Cities are the largest polluters. They are responsible for about 60 percent of all water pollution. This pollution is mostly in the form of untreated or partially treated sewage that is dumped into the water. Industry is the second largest polluter. Besides sometimes using municipal treatment facilities, industries often empty wastes with inadequate treatment from their own outfalls into streams, rivers and lakes.

Because of the different uses for which people require water, the Federal government, through the Water Quality Act of 1965 required the states to set water quality standards or uses for interstate waters.

This meant the states had to:

1) determine which use or uses, future and present, interstate waters would be protected for (e.g., recreation, aquatic life, public water supplied, agriculture industry);

2) designate where on lakes and rivers each of these standards would be applied or where they might be applied in the future;

3) devise a plan, a timetable and a way of implementing these standards. This is the basis and the key to the Federal water quality standards program.

The Federal Water Pollution Control program for "Clean Water" is based to a large extent on making sure that the water quality use designated by states for each area is observed.

When there are two competing uses for that water, the use which demands the cleanest water prevails. For example, if fish spawning

and industry were both on the same end of the river, the standards for fish spawning would prevail for the river's water quality standard.

FWPCA is using computers to check on progress by the states in implementing their water quality standards. The computer printout is helping FWPCA to set priorities for improvement and to check to see if deadlines for better water quality are being observed nationally.

Another aspect of water quality is the non-degradation of waters. What this means is that waters, where existing quality is better than the established standards, should be maintained at present quality. This is to insure that no matter what water quality use is set for an area, that use will not ever be interpreted as a license to pollute, or lower the existing quality of the water.

This profile of mid-America's waters attempts to show that there is a serious threat of pollution from many sources. Each of the waters has its own unique problem, yet they all have common troubles as well. The profile also shows what is being accomplished by the Federal Water Pollution Control Administration in helping clean up our waters.

There is a selection on new problems in the field of water pollution, a section on how pollution affects the quality of our lives and there are suggestions or just what you can do, as a private citizen, to bring clean water to mid-America.

TYPES OF POLLUTION	WATER QUALITY USES MOST AFFECTED			
	Recreation	Aquatic Life	Municipal Water Supply	Industrial Use
Bacteria	X		X	
Turbidity (muddy water)	X	X	X	X
Lack of Dissolved Oxygen		X		
Inorganic Materials				
(Iron and Manganese)		X	X	
(Copper and Lead)	X	X	X	
Phenols (smelly, bad taste substance)	X	X	X	
Organic materials (oil, pesticides, exotics)	X	X		
Radioactivity	X	X	X	X
Heat	X	X		X
Nutrients (Phosphorus and Nitrogen)	X	X	X	X
Dissolved Solids			X	X

NEW PROBLEMS

As American life becomes more technologically complex, the problems of the environment become correspondingly more sophisticated. These newly recognized problems have gathered much public attention in mid-America:

URBAN RUNOFF

There are two considerations to urban runoff. First, as more and more land is covered by concrete and asphalt, there is less ground available for absorbing water, which means that more stormwater ends up in sewers. Many of these same sewers also carry wastes. The total begins to exceed the sewage treatment capacity and much untreated waste is sent directly to rivers and lakes. Secondly, the quality of stormwater runoff is decreasing, which means more pollution, especially when combined sewers overflow during storms. Increased pollution is coming from street refuse (litter) and dirty catch basins in addition to air pollution, roof discharges and chemicals used in the urban environment.

ANIMAL FEEDLOT WASTES

Pollution from animal feedlots located in Iowa, Illinois, Missouri and portions of Wisconsin and Minnesota is a serious problem. Feedlots are often located near rivers and streams where animals can water easily. Animal waste discharges has meant the addition to the streams of untreated wastes in high amounts, thus adding nutrients and bacteria.

COMPLEX CHEMICAL COMPOUNDS

Our rapidly growing technology has produced significant numbers of complex chemical compounds, the effects of which we are only beginning to explore. In plastics, drugs and other fields where chemicals are combined to form new products, effluents are being produced which have yet to be investigated for their effects on the aquatic environment. It soon may be necessary to go beyond conventional treatment of these wastes.

RADIOACTIVITY

It is not known how much of a problem this is going to be. Some feel that before the many projected nuclear plants along the Great Lakes are put into operation in the seventies, the present criteria for radioactivity levels may need to be strengthened.

PESTICIDES

One-point-twenty-five billion pounds of pest control chemicals are produced in the United States each year. Seventy-five percent is applied to less than 2 percent of the land. A five-state governor's conference was held in Chicago in March of 1969 to consider a course of action in the wake of rising levels of pesticides in Lake Michigan coho salmon.

Out of that meeting came a monitoring program which Department of the Interior and state representatives are now conducting. Some states, like Michigan, banned the sale of DDT in the wake of seizures of contaminated fish. Most fish species are highly susceptible to chlorinated hydrocarbon pesticides like DDT. There is much new research needed here.

THERMAL POLLUTION

Hot water comes from both conventional and nuclear power plants. The latter heat up twice as much water. The overall

effect of hot water on the lakes is not the concern. The localized effect is the problem. FWPCA's National Water Quality Laboratory is studying just what the local effects of this heat are at the point where it is discharged. Will fish spawn too quickly, will some aquatic imbalance result among organisms along the shoreline? These questions have to be answered.

OFFSHORE DRILLING

There have been requests to drill offshore in Lake Erie for oil and gas. FWPCA is in the process of developing a national policy on offshore drilling. There are other types of drilling in the Great Lakes. For example, there is manganese mining in the Green Bay area and there are cross-country oil pipelines across many of our lakes and rivers.

SMALL LAKE POLLUTION

One of the American dreams is that of a small summer place on a little lake or river where you can spend the annual vacation swimming, boating and fishing. For many vacationers on small lakes, this dream has vanished as lakes become polluted and turn into green fields of algae when septic tanks leak from summer homes. Reversal of this process is slow—sometimes it never happens.

SHORELINE CONSTRUCTION

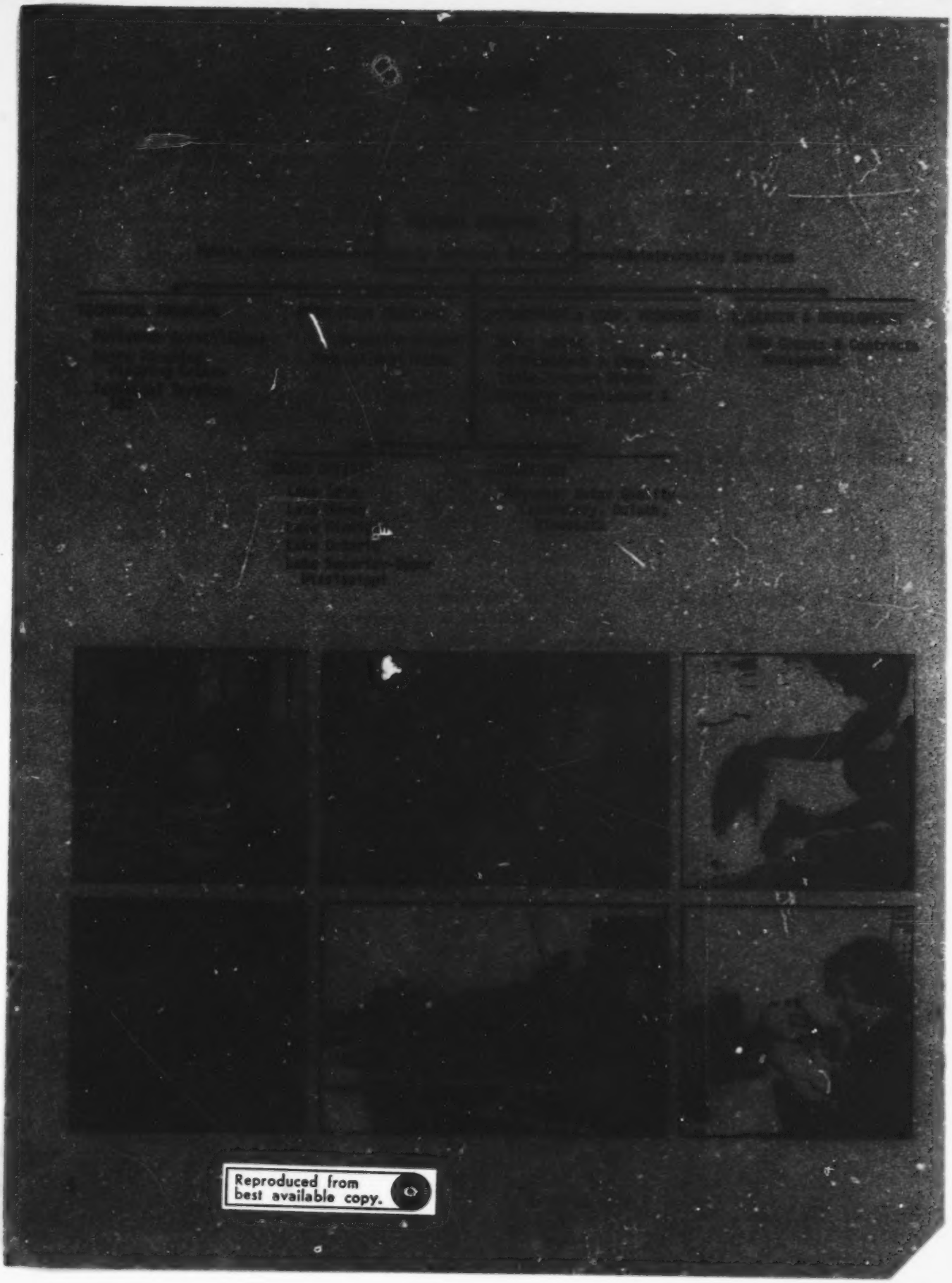
There is a delicate ecology along the shoreline of our waters. When land and water meet special plant and animal systems and relationships develop. The areas provide part of the aquatic and land food chains. When these waters are filled in to make more land, the "middle worlds" disappear and the balance of nature is upset, often to the detriment of the plant and animal ecology.

COMBINED SEWERS

All of our older and larger cities are partially or wholly served by combined sewers. These are large sewers designed to carry both sewage and stormwater. When there is no stormwater, large amounts of putrid sewage builds up on the bottom of these sewers. Stormwater flushes the sewage out into streams and lakes causing pollution. Many Great Lakes beaches have been closed due to these combined sewer discharges.

GROUNDWATER POLLUTION

Poor wastewater controls and land management are a potential source of pollution to aquifers that supply groundwater for urban and agricultural needs.



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FWPCA-WORKING FOR WATER QUALITY

The official name is five words long: Federal Water Pollution Control Administration. You can describe its job in just two words: STOP POLLUTION.

Under this two-word mandate the Federal "Clean Water" program operates, reaching into hundreds of villages and cities across the American landscape, from quiet river-front towns with names like Keokuk and Quincy, to huge mega-cities like Chicago, Detroit and St. Louis.

Help in stopping pollution in Newfolden, Minnesota is in the form of a Federal grant for sewage plant construction. In Chicago it is a research grant to find new ways to store heavy loads of stormwater. In Gary, Indiana it is providing on-scene assistance to industries that want less expensive ways to stop pollution, in Cleveland it is the reconvening of a conference to enforce timetables in cleaning up pollution of Lake Erie. Basically, the Federal program acts in four ways: it gives financial help, it gives technical advice, it keeps tabs on pollution and it acts to stop pollution.

LEGISLATION

The campaign to stop pollution is not a new one. The first law was passed in 1899. Known as the Rivers and Harbors Act, it prohibited discharge or deposit of any refuse into navigable waters.

In 1924, the Oil Pollution Act was signed into law. It prohibited the discharge of oil into costal waters.

In 1948, the first Federal Water Pollution Control Act was passed. In 1956, the first permanent full scale clean-up program received Congressional approval. With this new law came the legal machinery to hold enforcement conferences throughout the United States and to take polluters to court, if necessary. Federal grants were also authorized for building sewage treatment plants in communities across the country.

That Federal Water Pollution Control Act was amended in 1961 as the Congress attempted to strengthen the enforcement authority and increase support for construction of waste treatment works and research.

In 1965, the Water Quality Act was passed. This Act further amended the Federal Water Pollution Control Act and established the Federal Water Pollution Control Administration in the Department of Health, Education and Welfare. The Water Quality Act also required establishment of water quality standards for all interstate and costal waters in an effort to set up a new way to *prevent* pollution before it begins.

A Presidential Reorganization Plan, issued in 1966, transferred the Federal Water Pollution Control Administration to the Department of the Interior.

In 1966, the Clean Water Restoration Act was passed. It

greatly increased grant authorizations to help build sewage treatment plants, for research and for grants to the state water pollution control programs.

ORGANIZATION

The FWPCA headquarters is in Arlington, Virginia, just outside Washington, D.C. It serves as an administrative home base for nine regions located in the major drainage basins of the United States

The Great Lakes Region, with its headquarters in Chicago, administers the Federal clean-up programs for all five Great Lakes and the Upper Mississippi River, as far south as the junction with the Ohio River.

To administer the Federal program, there is a Chicago headquarters staff and basin offices in five cities—Minneapolis; Chicago; Detroit; Cleveland; and Rochester. In the Great Lakes Region there is also the National Water Quality Laboratory in Duluth, Minnesota. There, scientists develop water criteria needed to further evaluate use standards.

OPERATION

Each of the FWPCA regions is involved in the same type of operations, though emphasis in each may differ. In the East and South, there is great concern with preserving estuaries and tidelands, on the West Coast the threat of oil pollution and industrial wastes are of continuing concern, and in the Midwest, the premature aging of the Great Lakes is the greatest worry.

There are numerous FWPCA programs in the Great Lakes Region. They include:

CONSTRUCTION GRANTS

The Great Lakes Regional Office administers a multi-million dollar aid program of matching grants to cities and towns to help them build sewage treatment facilities. These grants are made directly to municipalities throughout the region after the States set priorities. From the start of the grants program in 1956, 166.4 million dollars of Federal grants have been offered in the Great Lakes Region. Grants have been as small as $2,129 or as large as $8.5 million.

FEDERAL ACTIVITIES

By Executive Order 11288, the President of the United States ordered that Federal facilities throughout the country comply with water pollution laws. The Federal Activities branch of the Great Lakes Region monitors Federal installations to make sure compliance with these laws is observed. The branch also assists these facilities in coming up with pollution control programs. A good percentage of the Federal Activities branch work involves commenting on permits being sought from other governmental agencies, such as permits for dredgings sought from the Corps of Engineers by various industries.

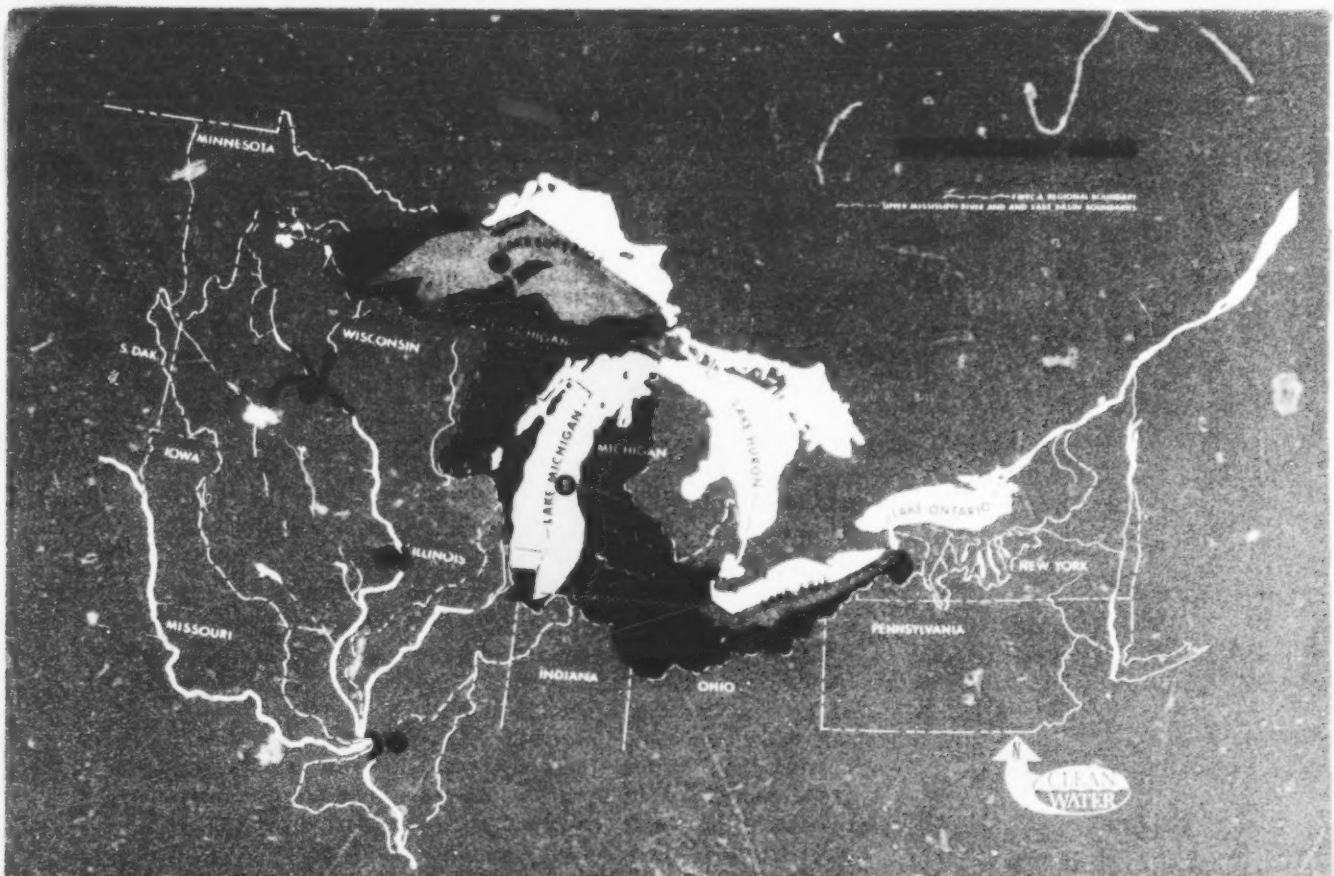
ENFORCEMENT AND COOPERATIVE PROGRAMS

Since the 1956 Water Pollution Control Act was passed, the FWPCA has held 46 enforcement actions throughout the United States, 10 of them in the Great Lakes Region. The *enforcement action* is a three-step legal action to stop pollution. The first step is the convening of a conference, the second a formal hearing and the third step is court action. Most actions end at the conference stage, with conferees— made up of representatives from the States concerned and the Federal government— agreeing on a time-table for ending pollution and establishment of committees to consider specific pollution problems of the conference area. The conference findings are submitted to the Secretary of the Interior for approval, and from time to time, the conference is reconvened to check on progress.

Enforcement personnel of the Great Lakes Region, besides preparing for conferences, also handle a number of other related programs. The *Water Quality Standards and Compliance* section, in cooperation with field offices, makes sure that the standards set by the States for their waters are followed. If a recreation site on the Mississippi, for example, had to be closed because a new factory began dumping wastes, then a violation of water quality would exist and action might be taken. Another instance might be where heat waste from a power plant would intrude on a fish breeding area and disturb reproduction. The water quality section also acts as a liaison between States which propose standards and the Secretary of the Interior, who either accepts or rejects them.

Another section is *State Program Grants.* Under this program, FWPCA makes grants to help State and interstate pollution control agencies meet their operating costs in pollution control and in training personnel.

The *Manpower Training and Development* section of the *Cooperative Program* distributes funds and assistance to help train sewage plant operators through on-the-job training and establishment of school training.



Estimated Total Amounts to be Expended in Compliance with Enforcement Action Recommendations
(As of July 1, 1968)

Enforcement Action Area	Number of River Miles Affected	Date of First Session of Conference	Number of				Estimated Total Amount to be Expended in Compliance with Enforcement Recommendations
			Municipalities 1/	Industries	Federal Installations	Institutions	
Upper Lakes Region							
Upper Miss. River-Illinois, Iowa Area (Iowa-Ill.)	20	2/8/68	14	16	3	–	$ 12,000,000
Miss. River-St. Louis Area (Mo.-Ill.)	200	3/4/64	22	49	–	1	200,000,000
Detroit River (Mich.)	32	9/27/65	11	38	2	–	180,000,000
Menominee River (Mich.-Wisc.)	120	11/6/68	7	4	1	–	10,000,000
Upper Miss. River (Wisc.-Minn.)	270	2/7-8/64	35	48	7	–	78,000,000
Grand & Little Calumet Rivers, Etc. (Ill.-Ind.)	38 2/	1/2-3/68	22	46	6	–	250,000,000
Lake Erie Basin-Ohio-Pa.-N.Y.-Ind.	1,850 3/	3/3-4/68	118	161	11	–	3,000,000,000
Lake Michigan (Wis.-Ill.-Ind.-Mich.)	1,340 3/	1/31/68-2/2/68	130	38	20	–	4,000,000,000
Lake Superior (Wisc.-Minn.-Mich.)	700 3/	5/14-15/68	4/	4/	4/	4/	5/
TOTALS	4,555 4/		414	311	49	1	$9,735,000,000

1/ Includes sewer districts
2/ In addition to open lake waters and shoreline
3/ Does not include "Detroit River, (Mich.)" which is within this area
4/ No conference summary or recommendations have as yet been issued
5/ [illegible]

TECHNICAL PROGRAMS

The Technical Programs people support enforcement and other programs like construction grants through *Evaluation Surveillance* which is in core headed in cooperation with the basin offices. The Technical Programs Office also furnishes *Technical Services* to industries and cities on long-term and on a "trouble shooter" basis. Assistance here also comes from the basin offices and National Water Quality Laboratory.

Technical Programs also handles grants for comprehensive water planning as part of the cost of administrative expenses of planning agencies which are working to develop comprehensive water quality control and pollution abatement plans for small river basins.

The office also works with its Canadian counterpart in joint water pollution control planning for the four Great Lakes which share common boundaries with Canada. This partnership in tackling problems is handled through the framework of the International Joint Commission in Ottawa, Canada and Washington, D.C.

RESEARCH AND DEVELOPMENT

The Great Lakes Regional Office administers research and development projects which have been approved and are in line with a full-scale national program to find out more about how the environment works and discover better ways to prevent pollution and treat waste. Numerous grants are made annually to universities and individuals engaged in research programs.

There are grants also for demonstration projects, advanced waste treatment plants, industrial demonstration projects and for training and research study at the graduate level.

ADMINISTRATION AND INFORMATION

The Great Lakes Region has its administrative section in the Chicago office and its main duty is to support FWPCA personnel. A *Public Information Office* is also maintained to keep the staff and the public informed on what is being done to "stop pollution."

NATIONAL WATER QUALITY LABORATORY

The mission of the National Water Quality Laboratory, located on Lake Superior north of Duluth, Minnesota, is to produce objective, factual information upon which State-Federal standards for water quality can be based. The staff includes biologists, chemists and engineers. The research program at NWQL serves as a national focal point for university research financed by the Laboratory.

The Laboratory has modern and complex equipment for chemical analysis, including an atomic absorption spectrometer, a gas chromatograph and an electron microscope. Other instruments can record the breathing movements of small fleas no larger than a pinhead.

Unique test systems are used in which aquatic animals can be exposed to any concentration of any pollutant so that the effects can be measured and a non-harmful level determined.

BASIN OFFICES

Basin office people (engineers, chemists, biologists, and other resource experts) help the regional programs by on-the-scene action at oil spills, in gathering of background date for enforcement actions, in preparation of conference reports, in close surveillance of their assigned basins and in preparing water quality management plans for the basin.

Detailed knowledge of the local water quality situation also enables basin offices to provide assistance to State and local agencies. By maintaining close contact with State and local groups, a more representative regional program can be developed. The basin offices are equipped with laboratories to provide analytical support and scientific assistance to Federal and State programs.

THE ROLE OF THE STATES

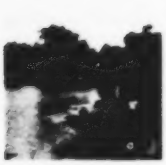
The Great Lakes Region encompasses parts of 11 States—Minnesota, South Dakota, Iowa, Missouri, Illinois, Wisconsin, Indiana, Michigan, Ohio, Pennsylvania and New York.

These States—through their own pollution control agencies—are the direct overseers of water pollution control programs. The Federal programs support and assist State efforts to establish standards, conduct surveillance, plan for the future, enforce laws, build sewage treatment plants and train water pollution specialists.

Federal grants for construction are administered through State agencies. The Federal enforcement program and water quality standards program also operate through State agencies. In addition, Federal cooperation is extended to the States in setting up monitoring programs and in personnel training programs.

The need for strong pollution control programs on the State level is important since the Federal program is geared principally to *interstate* bodies of water. The State is normally responsible for *intrastate* waters. With a strong State program of prevention and enforcement all the waters of a State can then be maintained at a high level of quality.

New York, Pennsylvania, Ohio and Michigan have passed multi-million dollar bond issues to combat water pollution, to meet the dates set for ending pollution of the Great Lakes, of the Upper Mississippi River and of even those lesser bodies of water that may simply be known as "the old swimmin' hole" or a "good spot to catch panfish."



CITIES

It is estimated that between 60 and 70 percent of all water pollution is caused by sewage from cities and towns. It used to be an old maxim that "dilution is the solution to pollution." Municipalities ran their sewage pipes to the nearest river, , stream or lake and that was that. But as time went by and population mushroomed to produce mega-cities like Chicago, Detroit, and Cleveland, dilution no longer was the solution, especially for towns further downstream.

Sewage treatment was the answer, and it still is. When the Federal water pollution control program first began, the goal was that all urban areas should have mechanical or primary treatment. In this process, coarse particles are screened out of the water. Floating contaminants are removed by a skimming process, and solids that settle are collected. They are then either stored in air-tight tanks to ferment by bacterial action or are separated and burned or buried.

But as the deterioration of water quality continued, FWPCA found it necessary to set biological, or secondary, treatment as a goal for sewerage systems. In secondary treatment, bacteria —either aerobic or anaerobic types—are used to decompose the sewage under controlled conditions. This prevents oxygen depletion of the water in the streams and lakes.

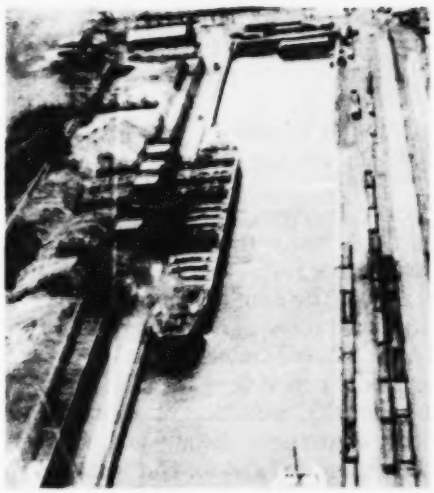
Construction grant funds for treatment plants now support this secondary method. The Federal construction grants program was set up to construct treatment facilities in all municipalities by the early part of the 1970's.

In many areas, biological treatment may not be enough. The FWPCA is cooperating in a number of research and demonstration programs on the use of a third additional step in treatment employing chemical means. Chemicals are added to precipitate, float or coagulate solids so that they can be removed by mechanical processes. In some waters, like Lake Erie, this tertiary form of treatment is already considered to be a necessity, since it removes nutrients from the wastewater. An experimental physical-chemical process that removes the second, or biological step, is now being tested in Washington, D.C.

Another concern in municipal treatment is efficiency. There has been much emphasis on construction of sewage treatment facilities, but not on maintenance. This means that in some areas, a plant, because it is not being run correctly, might be working at 20 percent, 50 percent or 80 percent efficiency. This means that a percentage of the oxygen-demanding wastes are still going into the water untreated. The FWPCA has emphasized that there must be adequate training of the men who operate these plants.

The problems of the city, like all its other urban problems, are on the increase, but technological solutions are available.

INDUSTRIES



The Great Lakes Region is the industrial heartland of America. Manufacturing activity is over 45 billion dollars annually—one-fourth of the nation's total. One reason for this concentration of industry has been the availability of fresh water, lots of it. That is a must for processing steel, making pulp, ore processing and manufacturing chemicals, as are the waterways for economical transporting of oil, grain, and coal.

United States industry on the Great Lakes alone uses 4 trillion gallons of water per year for processing and cooling. It takes 30,000 gallons of water to make just one ton of steel.

Industrial pollution can mean the addition of oils to water, phenols which bring taste and odor problems, phosphorous or nitrogen which overenriches the waters, dissolved solids, etc. There are other problems from industry also. Power plants add heat to the waters, damaging aquatic life, and hurrying the growth of algae. Industries add huge quantities of chemical substances to the water, including many compounds whose effects are unknown.

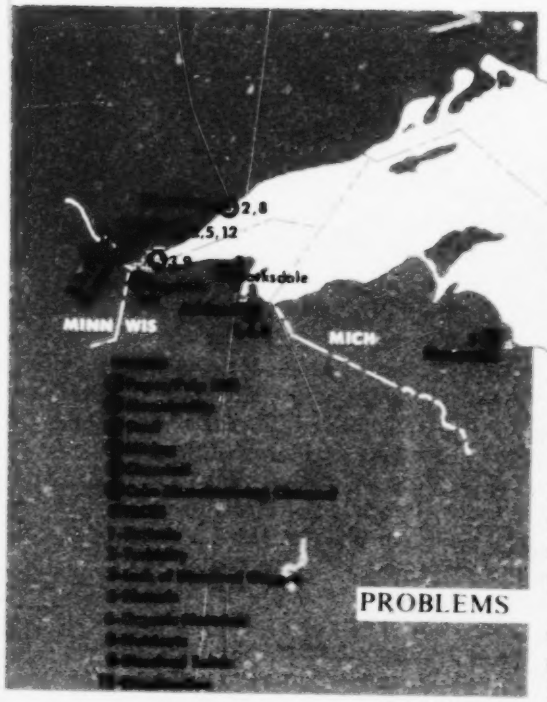
The philosophy of Federal water pollution control is simple: The polluter is responsible for cleaning up his own mess.

In the case of municipalities, there is Federal money available to pay for up to half of the cost of treatment plants. But industry has to pay its own way for the most part. The government does provide technical assistance to help with the job, sometimes gives a demonstration or research grant to industry, and some States provide tax incentives. But for the most part, industry has to pay its own bill and must consider pollution control part of the cost of doing business.

INDUSTRIAL-MUNICIPAL USE OF WATER

LAKE	INDUSTRIAL	MUNICIPAL
Erie	1,200 mgd *	9,600 mgd *
Ontario	300	2,100
Michigan	4,250	1,470
Superior	563	25
Huron	860	140

* million gallons per day



TROUBLED WATERS: Lake Superior

Lake Superior, the "Gitche Gumee" of Longfellow's *Hiawatha*, is considered the cleanest, most primitive of the Great Lakes. Its waters are cold. You can take a dipper and scoop a drink almost anywhere on it. It is the largest of the Great Lakes with a surface area of 31,820 square miles.

One of the reasons for the clean water of Lake Superior is the low population density in its watershed. The average density is only about 30 people per square mile. Nevertheless, the United States population is expected to increase in the area by 100,000 in the next two decades.

Lake Superior is called a very young or "oligotrophic lake," in contrast to Lake Erie which is considered "eutrophic" or an old lake. Because it has been relatively free of age-adding pollution, Superior is very sensitive to any form of pollution.

PROBLEMS

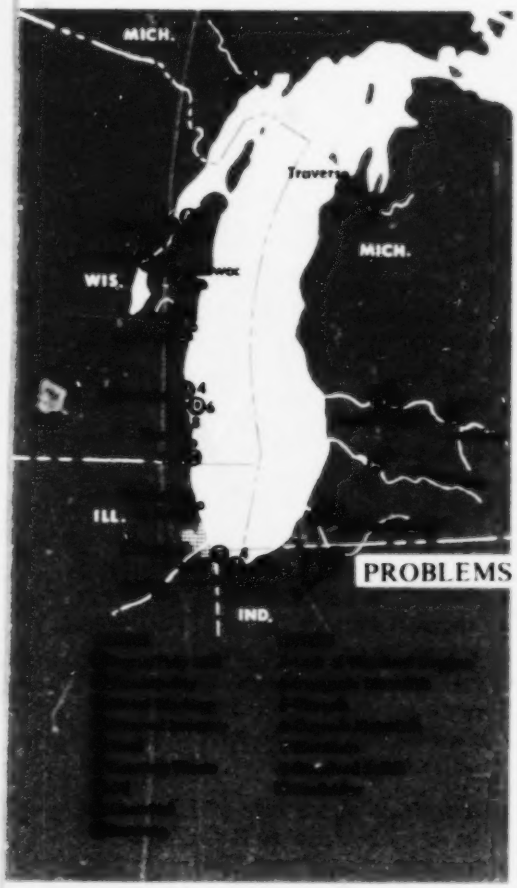
When you see the algae piled up on the shores of Lake Ontario, or smell the industrial discharges on the southern end of Lake Michigan, or see the closed beaches of Lake Erie, you realize that Lake Superior's problems are small. So, the Federal program for Lake Superior emphasizes prevention: taking action *before* pollution creeps in.

Some problems:

* The discharge of treated and untreated municipal and industrial wastes has caused oxygen depletion in some of the tributaries draining into Lake Superior. Those tributaries include the St. Louis and Montreal Rivers and the Duluth-Superior Harbor.
* Poor land management on the Wisconsin side has resulted in red clay runoff which discolors the water and damages aquatic life.
* Polluted dredgings contribute to the degrading of the Lake's waters.
* Commercial, recreational and Federal vessels contribute toilet and cooking wastes.
* Taconite ore tailings, damaging to aquatic life, are dumped at the rate of 60,000 tons per day at Silver Bay, Minnesota.

SOLUTIONS

FWPCA, after issuing a comprehensive report on the Lake Superior basin the spring of 1969, met with representatives of Minnesota, Wisconsin, and Michigan at an enforcement conference in Duluth, Minnesota. The conference called for a six-month study to find alternate ways of disposing of tailings. Also to be studied were stricter water quality standards for the region. Secondary treatment for all municipalities and industries by 1973, reduction of phosphorous discharges from municipalities, continuous disinfection of any wastes containing pathogenic organisms and an end to the dumping of polluted dredgings in the Lake were also agreed on.



TROUBLED WATERS: Lake Michigan

Lake Michigan is one of the most heavily used of the Great Lakes. On its southern shore is Chicago, Sandburg's "city of the big shoulders." Just south of Chicago is the Calumet region, where America's largest steel producing complex has risen on the prairie and dune shore. Throughout Michigan, Illinois, Indiana and Wisconsin, there are thousands of recreation areas on or near Lake Michigan.

Chicago is the busiest inland seaport in the world. Industrial water use of Lake Michigan is an estimated 4.25 billion gallons per day. By the mid-1970's, at least seven nuclear power plants will be on the shores of the Lake.

Demand for municipal waters is anticipated to increase three times by the turn of the century.

PROBLEMS

Varied activities make high quality water necessary. However, at present, the condition of the Lake is deteriorating and, after Lake Erie, Lake Michigan is the most dangerously ill of the five inland waters.

The main problems are:

* Eutrophication—accelerated aging from fertilizer-rich waters that promote algal growth and eventually lead to depleted reserves of oxygen in the Lake.
* Thermal pollution—localized concentrations of heated water near fossil-fuel and nuclear power plants. This means damage to the aquatic life and water ecology.
* Disposal of polluted dredgings from Calumet area harbors into the Lake.
* Wastes from watercraft, from combined sewer overflow and from agricultural runoff.
* Industrial wastes and oils and other industrial pollutants from the Calumet area, Milwaukee and the paper mills of Green Bay.
* Alewife die-offs.
* Pesticide levels in fish are higher than in any of the other Great Lakes.

SOLUTIONS

The Lake cannot easily flush itself. This means that any serious pollution may be irreversible.

Timetables have been set up through the Calumet Enforcement Conference and the Four-State Lake Michigan Enforcement Conference, for abatement of pollution in the early 1970's.

Passage of bond issues in some States has indicated the general commitment to save the Lake. A five-state governor's conference on pesticides was called and is acting on information being developed by a monitoring system.

Following its national policy, FWPCA has continued to object to the dumping of polluted dredgings into the Lake.

The cost for cleaning up Lake Michigan has been estimated to run anywhere from 2 to 10 billion dollars.

TROUBLED WATERS: Lake Huron

Like Lake Ontario, Lake Huron touches on Canada and a single U.S. State, in this case Michigan. Lake Huron's quality is close to Lake Superior's, but the symptoms of misuse and premature aging are clearly revealing themselves along shores, bays and tributaries. Because Lake Huron has been assumed to be in good condition, complacency could surely cause its destruction. Lake Huron lies in the chain of the Great Lakes at a point where it can receive pollutants from Lakes Michigan and Superior. These pollutants, in addition to those received by Lake Huron from its tributaries, could possibly have an adverse effect on downstream lakes, especially Lake Erie. The United States population in the Lake Huron basin was 1.2 million in 1960. By the first part of the 21st century that figure will double. Industry in the area is expected to double also in that time. Municipalities now draw over 70 million gallons of water per day from the Lake. Some 49 industries in the basin use 860 million gallons per day of water, much of it from Lake Huron.

PROBLEMS

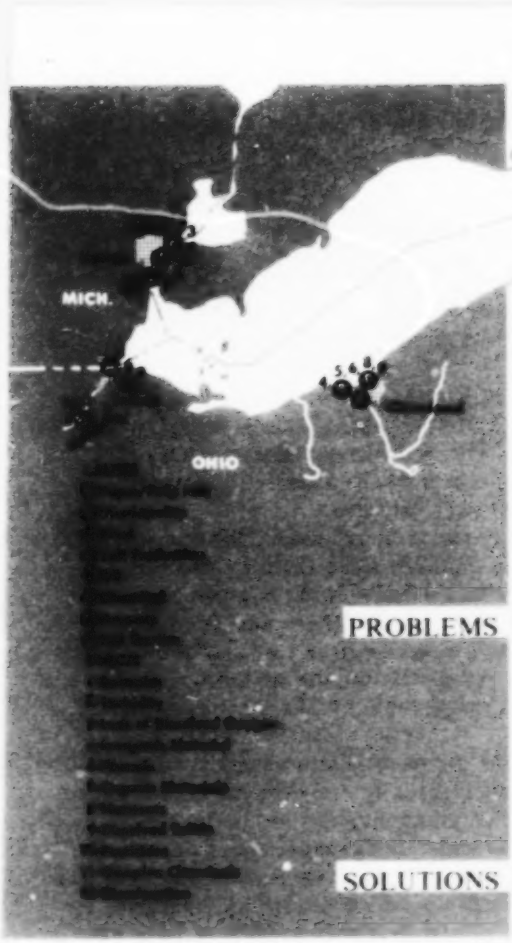
- Phosphorous is being dumped in at the rate of 3.2 million pounds per year. This could increase to 8.8 million pounds by century's end if treatment is not provided.
- There is excessive algae found throughout Saginaw Bay.
- Oxygen depletions are severe in the Saginaw River tributaries and parts of Saginaw Bay.
- Water quality has been degraded in the northern areas of Michigan where there has been heavy recreational use of the streams. There has also been a slip in water quality on small size tributaries where urbanized industrial areas are located.
- At present, the spoil from Corps of Engineers' and private dredgings is disposed of in open water and can create water quality problems as well as degrade bottom life.

Estimates on the cost of cleanup of Lake Huron range upwards from 115 million dollars at the present time.

SOLUTIONS

The FWPCA—in cooperation with the State of Michigan—is drawing up a comprehensive plan for cleaning up pollution in Lake Huron. Recommendations for cleanup include: removal of a minimum of 80 percent of the phosphorous in sewage, disinfection of municipal wastes, deposit of dredgings in diked shore areas and control agricultural runoff. Minimum stream flow control, control of vessel pollution and development of a comprehensive plan for the Saginaw River basin have also been suggested.

TROUBLED WATERS: Lake Erie



For most Americans the words "Lake Erie" are synonymous with the word "pollution." Lake Erie is the classic example of technological man's lack of concern for his own environment. Lake Erie is the model of what happens when people take a valuable resource for granted.

The scientists' explanation of what has happened to Lake Erie is accelerated "eutrophication" or aging. Lake Erie is a textbook case on the effect of too much fertilizer being dumped into water from municipal sewage, from industrial and agricultural discharge. Erie, the smallest of the Great Lakes, has aged an estimated 15 thousand years in the last half century because of what man has dumped into it.

- Municipal sewage accounts for most of the 137,000 pounds of phosphorous discharged into the lake each day.
- Industries are dumping chemicals that are toxic to fish and men.
- The aging has resulted in a depletion of oxygen, which in turn has meant the end of more desirable fish and their replacement with scavenger-types.
- Most beaches are unsatisfactory or borderline.
- Aging has meant shoreline littered with dead algae.

A pollution enforcement conference was called for the Detroit River in 1962 because of heavy pollution from the City of Detroit, the auto makers and a paint company there.

In 1965, all of Lake Erie and its interstate tributaries were brought under enforcement action. At that conference the machinery was set up for cleanup to be accomplished by 1972. A reconvening of that conference in June of 1969 indicated that because of lack of funds, among other things, there had been slippage and the 1972 date would not be met by many polluters, including the City of Detroit, which is the lake's largest contributor of pollutants.

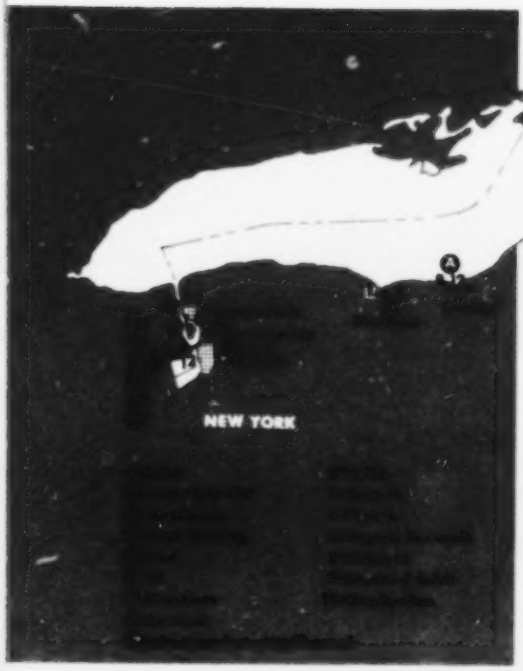
1973 has been set as the date for removal of phosphorus going directly into the lake from municipal discharges.

Industries have been told they must meet a 1971 deadline in cleanup and must have facilities equivalent to secondary treatment, especially if they have heavy oxygen demanding wastes.

In October of 1969, the enforcement provision of the water quality act was invoked to speed cleanup by 5 major polluters on Lake Erie. Under this action, polluters were given 180 days to come up with stronger cleanup programs or face court action.

Lake Erie is shallow and amenable to cleanup because of the relatively clean water that flushes through it from Lake Huron. There is hope, and many predict, that if strong action is taken now, Lake Erie will live.

TROUBLED WATERS: Lake Ontario & St. Lawrence River Basin



Because of its location in relation to the other Great Lakes —at the end of the chain—Lake Ontario is on the receiving end of pollution flow.

Lake Erie sends most of its waters to Lake Ontario, by way of the Niagara River and the world-famous falls. On the banks of this connecting river is a heavy concentration of industry that adds its pollutants to the already dirty waters of Lake Erie flowing into Lake Ontario.

The problem is not only the polluted water, coming in from Lake Erie and the City of Buffalo. Lake Ontario also has a perplexing problem of algae. *Cladophora,* a green alga, is nurtured by the Lake's nutrient-rich waters and produces an annual crop that has been known to grow to 15 or more inches long and attach itself to rocks. Swimming at many beaches has become unpleasant when this growth breaks loose and washes ashore to rot.

PROBLEMS

Alewives by the millions die each summer and are blown ashore, adding to the mess created by the decaying *Cladophora.*

The directed discharge of municipal and industrial wastes into the Niagara River presents an unaesthetic and potentially dangerous situation for users of that river's water, and adds to the other pollution problems encountered on Lake Ontario.

Bacterial pollution has closed beaches on parts of Lake Ontario, in the Rochester area; and intermittantly has closed beaches on Seneca Lake at Geneva and on Cayuga Lake at Ithaca.

Oil pollution from various industries and vessels plus occasional oil spills is a continuing problem on Lake Ontario and its tributaries.

The Niagara River, connecting link between Lake Erie and Lake Ontario, is the largest single source of pollution to Lake Ontario. This pollution can be attributed to the large municipal and industrial discharges in the area and the already polluted water that comes from Lake Erie.

SOLUTIONS

The Federal government is helping the State of New York in its cleanup of Lake Ontario and its watershed. Under recommendations approved by the Secretary of Interior, a date of December 1972 has been set for abatement of municipal and industrial wastes in the Lake Ontario basin.

Advanced waste treatment has been recommended in areas where secondary treatment has not solved the pollution problems. Attempts are being made to cut down nutrients that are presently being dumped into the basin's water. Research will be needed to find more effective ways of controlling algae.

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TROUBLED WATERS: Upper Mississippi River Basin

It begins in Lake Itaska, flows northward to Bemidji, Minnesota, passes through several large reservoirs on its eastward trek towards Grand Rapids and then swings southward, picking up steam at the Twin Cities along with power and size as it rolls down past Dubuque to St. Louis and then, along where Huck Finn rode his raft, towards Memphis and Natchez and then to the sea below New Orleans.

The role in American history of "The Father of Waters" is as long and wide as the dimensions of this great east-west marker for the United States.

A pictorial history of paddle-wheel steamers, twain-marking sailors and isolated American towns is still in the menory of every young boy who has an urge to float down to New Orleans on a raft, with a fishing pole in trawl.

Today the mighty river is as important as it ever was as a commercial artery with barges hauling about 45 million tons of commercial goods along it annually.

But the Mississippi still floods. In the spring of 1965, that flooding cost the people of the Upper Mississippi about 140 million dollars, in 1969 it cost many million more.

Once little towns along its banks are now mostly big cities with big populations and industries now demanding more and more clean water. Their demand will be tripling in the next score of years.

Inadequate treatment of municipal and industrial wastes, are the big problems on the Mississippi. Heavy amounts of pollutants are coming from municipalities in the Twin Cities area, along the Iowa side and St. Louis portions of the river. The agricultural problem is especially bad along the Iowa-Illinois boundaries of the river.

The Army Corps of Engineers, in conjunction with the Department of the Interior and other agencies, is preparing a comprehensive plan for the Upper Mississippi River basin.

In the spring of 1969, the Department of Interior called a conference to fix water quality standards for the State of Iowa, when that state failed to come up with standards acceptable to the Federal government. The major point of issue was the Federal insistence on secondary treatment for Iowa cities and industries which discharge into the Mississippi and Missouri rivers.

Three enforcement conferences have been held along the Mississippi—in the St. Louis metropolitan area in 1958, at Clinton, Iowa in 1962, and in Minneapolis for the Upper Mississippi in 1964, 1967 and 1969.

WATER & THE QUALITY OF LIFE

A certain philosophy should pervade any concept of environment. John Donne said that when the bell tolls, it tolls for you. We Americans are only now beginning to realize that we are involved as human beings in our environment just as much as a marsh hawk or whitefish or forest and that when the death bell sounds for our waters or plants or animals, it tolls for us as well.

Water, even more than any of our other natural resources, save air, is so intertwined with the existence of human beings, animals and plants that its quality and availability for us is of utmost significance in maintaining life on this thinly crusted biosphere called Earth.

The threat of pollution of our Great Lakes—the largest gift of fresh water in the entire world—is therefore of great concern, for the millions of humans who need it for their life and work and of untold value for those who will come after.

For conservation, preservation, heritage—call it what you like—water, like land and air, must be available not only for those living now, but for the generation who will one day soon follow us. If not, then there is no reason for man to reproduce himself, because what follows will be a mutation of man, not a man as we understand him to be.

Rene Dubos has written that men are adapting to a new environment, an environment that has been bent and twisted by technology, one that an earlier form of man might not be able to survive in, or at least would not have tolerated.

There is no justification for polluting our streams and rivers and lakes. We have the technology to clean them up, we know the problems. We can do the job. What we lack is time and commitment.

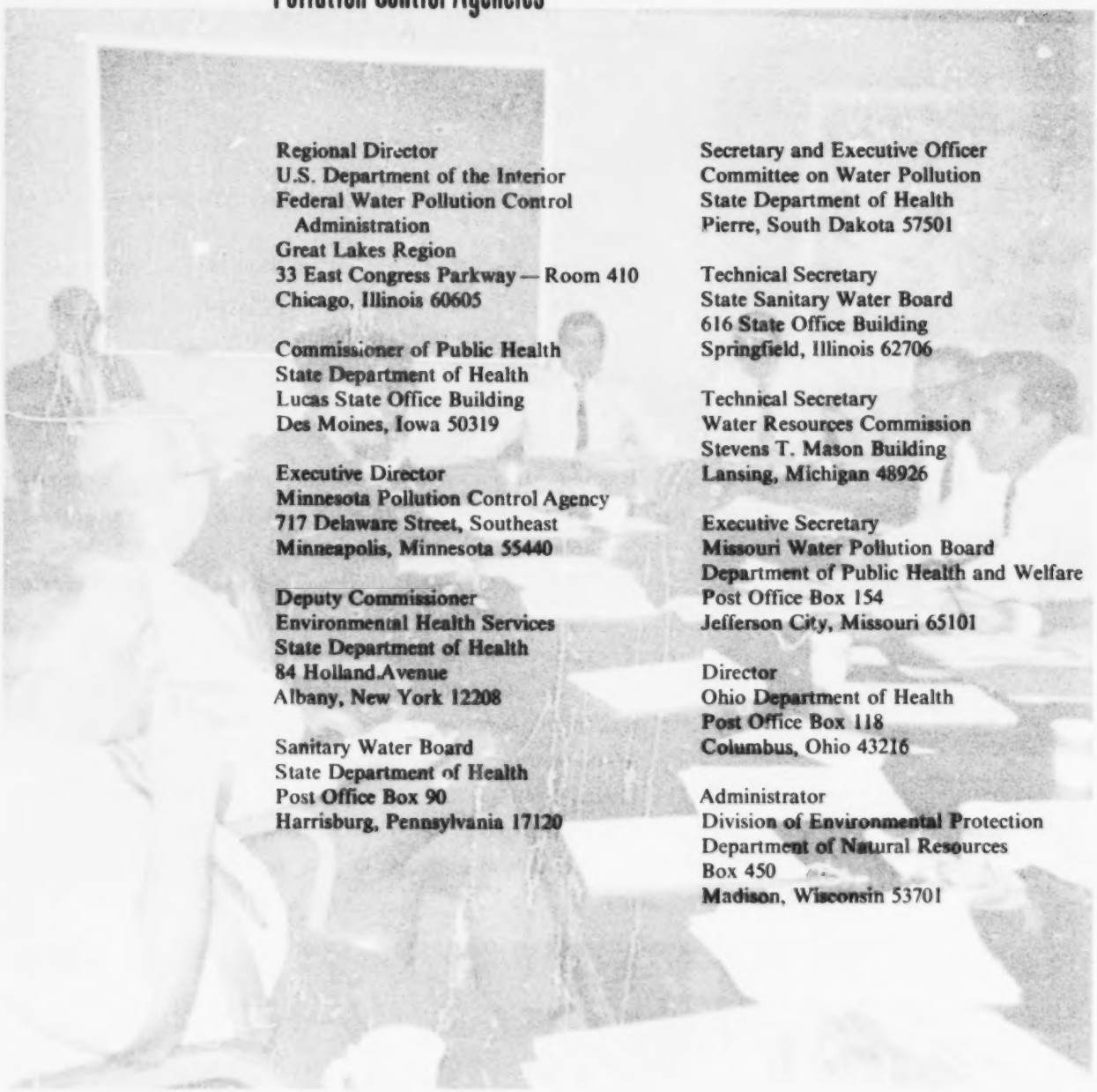
Our need for clean water is now, before it's too late.

Art work by R. Ladson, D. Sarmento, C. Spatafore, T. Peterson, C. Kurek and G. Patterson.

WHAT YOU CAN DO BEFORE IT'S TOO LATE

* Get the facts —
  - Find out which of your governmental officials deal with pollution control.
  - Get acquainted with them, find out what their programs are.
  - Make a survey of the programs yourself and understand the opposition against water pollution control.
  - Get reports from State and Federal government.
* Choose a course of action —
  - by encouraging discussion.
  - by supporting or opposing specific pollution control proposals.
  - by encouraging officials to study and plan projects.
* Build public understanding and support —
  - Make findings of experts available to help other citizens choose the right course.
  - Try and get your national and state and local organization to talk about water pollution control.
* Express public support where it will count —
  - Write your local, State and Federal officials.
  - Attend meetings that deal with pollution problems and make carefully prepared statements to these meetings.
* Report incidents of pollution to your local pollution control agency.

Pollution Control Agencies



Regional Director
U.S. Department of the Interior
Federal Water Pollution Control Administration
Great Lakes Region
33 East Congress Parkway — Room 410
Chicago, Illinois 60605

Commissioner of Public Health
State Department of Health
Lucas State Office Building
Des Moines, Iowa 50319

Executive Director
Minnesota Pollution Control Agency
717 Delaware Street, Southeast
Minneapolis, Minnesota 55440

Deputy Commissioner
Environmental Health Services
State Department of Health
84 Holland Avenue
Albany, New York 12208

Sanitary Water Board
State Department of Health
Post Office Box 90
Harrisburg, Pennsylvania 17120

Secretary and Executive Officer
Committee on Water Pollution
State Department of Health
Pierre, South Dakota 57501

Technical Secretary
State Sanitary Water Board
616 State Office Building
Springfield, Illinois 62706

Technical Secretary
Water Resources Commission
Stevens T. Mason Building
Lansing, Michigan 48926

Executive Secretary
Missouri Water Pollution Board
Department of Public Health and Welfare
Post Office Box 154
Jefferson City, Missouri 65101

Director
Ohio Department of Health
Post Office Box 118
Columbus, Ohio 43216

Administrator
Division of Environmental Protection
Department of Natural Resources
Box 450
Madison, Wisconsin 53701

Films Available *

Too Thick to Navigate, Too Thin to Cultivate — Water Pollution in the Great Lakes. CBS-Chicago documentary, runs 30 mins., color, 16mm.

Tom Lehrer Sings Pollution — Humorous attack on air and water pollution. Runs 4 mins., color, 16mm.

Clean Waters — Stresses importance of natural waters; dangers of pollution. Runs 30 mins., color, 16mm.

The Water Famine — CBS Reports documentary study of world-wide water problems. Runs 30 mins., black and white, 16mm.

Troubled Waters — Study of national water pollution problems. Produced by U.S. Senate. Runs 30 mins., color, 16mm.

Clean Water TV Spots — Series of award-winning TV commercials which emphasize the ugliness of water pollution. Time: varies, color, 16mm.

A Pictorial Survey of Water and Some of Its Uses in the Detroit, Michigan Area. Runs 30 mins., color, 16mm.

It's Your Decision—Clean Water — Produced by the Soap and Detergent Association and the League of Women Voters of the U.S., defines water management problems produced by increase in population and production. Runs 14½ mins., color, 16mm.

* Federal Water Pollution Control Administration
Office of Public Information
Great Lakes Region
33 East Congress Parkway — Room 410
Chicago, Illinois 60605

CLEAN WATER Publications*

What You Can Do About Water Pollution CWA-8 June 1967 flyer.
Full color leaflet on the theme that everybody can do something about water pollution; the builder, the farmer, the industrialist, the boat owner, citizens in all walks of life.

Your Career and Clean Water for America CWA-9 Revised August 1968 12 pp.
Recruitment leaflet lists twenty-one professional job titles of positions in water pollution control agencies. Describes briefly the main areas of activity within the Federal water pollution control program, including enforcement, research and technical assistance. Tells how to apply for Federal employment.

Showdown.....for Water CWA-11 October 1968 26 pp.
Full color publication describes briefly the water quality crisis in America today, then in more detail explains and illustrates the programs of the Federal Water Pollution Control Administration.

A Primer on Wastewater Treatment CWA-12 October 1969 24 pp.
Three color illustrated publication with text and diagrams. Gives basic information on sewage treatment practices and problems with emphasis on need for more advanced waste treatment techniques. Addressed to non-technical audience.

Water Quality Standards Better Water for America series CWA-13 8 pp.
Defines water quality standards, method of establishing standards and what results can be expected in improving the quality of America's waters. Describes State and Federal responsibilities in setting, enforcing, and revising standards.

Pollution Caused Fish Kills 1968 CWA-7 June 1969 16 pp.
Annual report on fish kills in the United States, listed by State. Tables show summaries of fish kills by source of pollution, water type, month, severity of kill and other categories. Highlights from State reports give specifics of selected kills.

Federal Water Pollution Control Act - Oil Pollution Act 1967 32 pp.
Verbatim copy of Federal Water Pollution Control Act, as amended by the Federal Water Pollution Control Act Amendments of 1961, the Water Quality Act of 1965, and the Clean Water Restoration Act of 1966. Reorganization Plan No. 2 of 1966, Executive Order 11288--Prevention, Control and Abatement of Water Pollution by Federal Activities. Oil Pollution Act as amended by the Clean Water Restoration Act of 1966.

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Chicago, Illinois 60605

GPO 815-708-2

"IT'S GETTING SO BAD THAT EVEN PEOPLE ARE COMPLAINING."

HERITAGE

CLEAN WATER

"JUST THINK—ONCE THIS WAS NOTHING BUT RAW WILDERNESS!"